Percutaneous management of a saphenous vein graft perforation using a covered stent and final coil embolization technique

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Abstract

Coronary artery perforation as a result of percutaneous coronary intervention is a rare complication which may result in cardiac tamponade, myocardial infarction and death. Perforation of a saphenous vein graft is unusual and generally requires surgical intervention. We describe a novel percutaneous approach that facilitated the successful management of a potentially catastrophic saphenous vein graft (SVG) perforation.

Key words: vein graft perforation

Coronary artery perforation as a result of percutaneous coronary intervention (PCI) is a rare complication (0.1%) [1] which may result in cardiac tamponade, myocardial infarction and death. The main predictors of coronary perforations are clinical (elderly, female gender), pharmacological (use of glycoprotein IIb/IIIa inhibitors), angiographic (small tortuous and calcified vessels) and procedural (stiff hydrophilic wires, artery to balloon ratio of > 1.2-1.3, use of atherectomy device) [1, 2]. We describe a novel approach that facilitated the successful management of a potentially catastrophic saphenous vein graft (SVG) perforation.

A 68-year-old female treated with CABG 5 years previously was referred for PCI after angiography demonstrated a significant SVG to the first obtuse marginal (OM) lesion. At PCI (right transradial access, 6 Fr Left Coronary Bypass (LCB) guide catheter (Cordis Corporation, New Jersey, USA)) the SVG was found to be occluded. A Pilot 50 wire (Abbott Laboratories, Illinois, USA) crossed the occlusion easily and the stenosis was pre-dilated with a 2.0 mm and a 4.0 mm balloon. Contrast injection via an Export catheter demonstrated intraluminal wire position and a good sized distal OM. A 4.5 × 24 Liberte stent (Boston Scientific, Natick, USA) was deployed at 17 atmospheres resulting in a class 3 perforation (Figure 1A), tachycardia and hypotension [2].

The stent balloon was immediately positioned within the stent and inflated to control the perforation. Intravenous protamine was administered and a transthoracic echocardiogram showed a posterior pericardial effusion with compression of the posterior left atrial wall in a position almost impossible to treat with percutaneous pericardiocentesis (Figure 1B). With the inflated balloon controlling the perforation a second 8 French LCB guide catheter was introduced from the femoral artery and positioned at

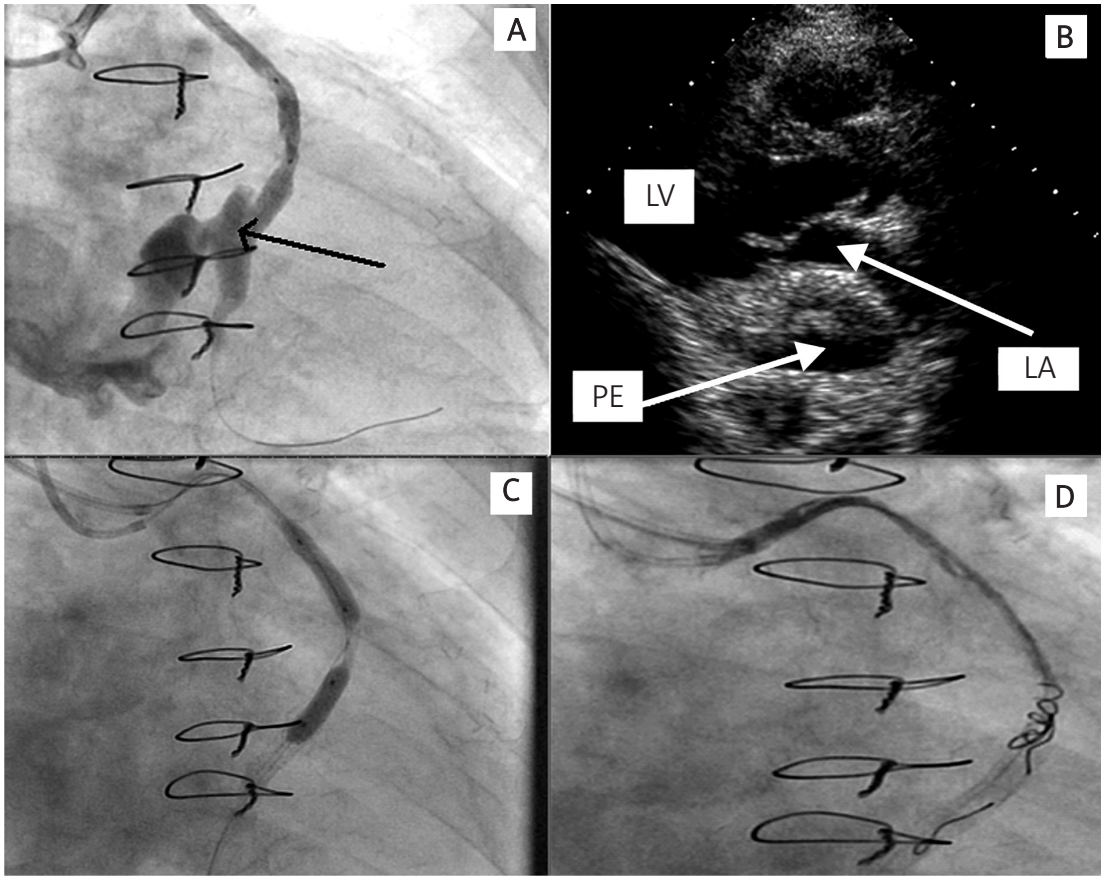

Figure 1. A – Class 3 SVG perforation following stent deployment. **B** – posterior pericardial effusion with compression of left atrium. **C** – positioning of covered stent over site of perforation using 2 guides and a proximal balloon. **D** – use of coils to achieve complete occlusion of SVG perforation

PE – pericardial effusion, LA – left atrium, LV – left ventricle, arrow indicates the site of the perforation

the ostium of the SVG alongside the original guide, which was partially backed out of the SVG ostium. A BMW wire (Guidant Corporation, Temecula, California, USA) was passed through to the distal vessel with a brief deflation and immediate re-inflation of the balloon controlling the perforation. A 4.0 × 15 mm balloon was then advanced along this second wire and positioned and inflated in the graft proximal to the first balloon. With the second balloon in place proximally, brief deflation and re-inflation allowed controlled removal of the balloon at the perforation site and deployment of a 4.5 × 19 mm covered Jostent (Abbott Laboratories, Illinois, USA) at the perforation site with minimal further flow into the pericardial space (Figure 1C). Using the same technique a 4.0 × 12 mm Jostent was deployed, overlapping with the initial covered stent. A small contrast leak persisted and coil embolization of the SVG with 4 Cook MicroNester® Embolization Microcoils™ (Cook Medical, Bloomington, USA) was performed via a microcatheter (2.4 F Progreat, Terumo [Leuven, Belgium]), achieving complete occlusion (Figure 1D). The pericardial collection resolved over 7 days. The patient remains well at six months and is currently angina free.

This case demonstrates how the novel use of a proximal balloon introduced via a second guide allowed controlled removal of the balloon sealing the perforation and delivery of covered stents and coils without further catastrophic bleeding into the inaccessible posterior pericardial space.

References

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